

BRIEF NOTE

NONPIGMENTED TUNICA VAGINALIS TESTIS IN THE OPOSSUM¹

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Compared to other male mammals, the American male marsupials have unusual reproductive systems: the scrotum is prepenial, the penis is bifid, and spermatozoa pair as they pass through the epididymis (Biggers 1966). In addition, it has been reported that the tunica vaginalis testis is always pigmented due to the presence of melanin (Ellsworth 1976). Biggers (1966) has suggested that the pigmented tunic acts as a black-body radiator and helps lower testicular temperature, which is necessary for optimal spermatogenesis in mammals.

In preliminary experiments designed to study the effect of temperature on spermatogenesis and sperm maturation in the opossum, we live-trapped 6 males and utilized 3 males raised in captivity. Examination of the pigmentation of the underlying tunica vaginalis testis was carried out superficially by noting the coloration of the tissue through the scrotal skin. Two of the 9 animals examined had 1 nonpigmented and 1 pigmented tunica vaginalis testis. The tunics, testes and epididymides of these animals were removed postmortem, weighed, fixed in buffered formalin, and processed for paraffin embedding. The tissues were sectioned at 7μ and stained with Harris' hematoxylin and eosin.

The nonpigmented tunics were entirely white, and the pigmented tunics were melanized except for the area surrounding the spermatic cord (fig. 1). The non-pigmented area of the melanized tunics was common in all animals examined at surgery or autopsy.

The average weight of the testes surrounded by nonpigmented tunics was 1.23 g (1.08 g and 1.38 g) and testes surrounded by pigmented tunics had an average weight of 1.31 g (1.16 g and 1.46 g). The average weight of epididymides surrounded by nonpigmented tunics was 0.61 g (0.56 g and 0.66 g), and the average weight of epididymides surrounded by pigmented tunics was also 0.61 g (0.60 g and 0.63 g). There may

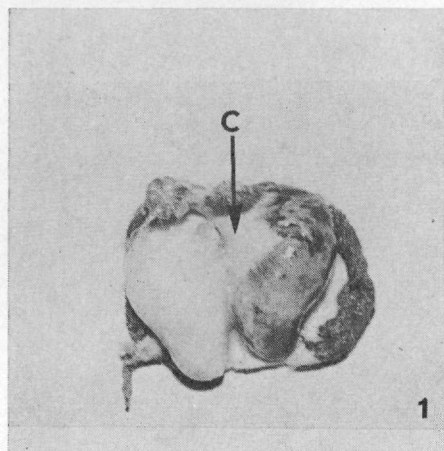


FIGURE 1. The scrotum has been dissected from the white tunica vaginalis and black tunica vaginalis of one animal. The pigmentation diminished in the central area near the exist of the spermatic cord (C).

have been a difference in testicular weights related to the pigmentation of the tunica vaginalis, but the limited sample size prohibited statistical analysis. There were no apparent differences in epididymal weights related to the pigmentation of the tunics.

Histologic examination of the testes

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surrounded by the nonpigmented tunic revealed that spermatogenesis was occurring in the seminiferous tubules (fig. 2). In addition, the presence of paired

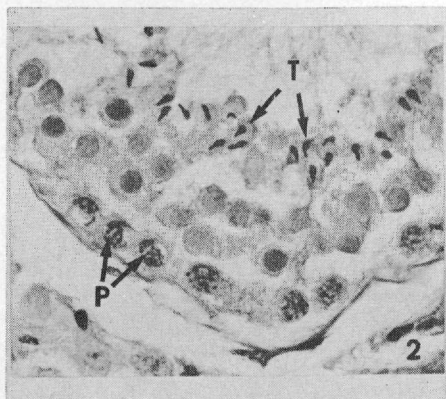


FIGURE 2. Normal spermatogenesis in a testis surrounded by a nonpigmented tunic is indicated by the presence of primary spermatocytes (P) and spermatids (T). Hematoxylin and eosin. 400X.

sperm in the caudal region of the epididymides surrounded by the nonpigmented tunic indicated normal sperm maturation (fig. 3). These appear no different than similar sections taken from testes or epididymides surrounded by pigmented tunics. Biggers (1966) suggested that the melanin in the tunic acts as a black-body radiator radiating all wave lengths of heat equally, thus lowering the testicular temperature, which is necessary for

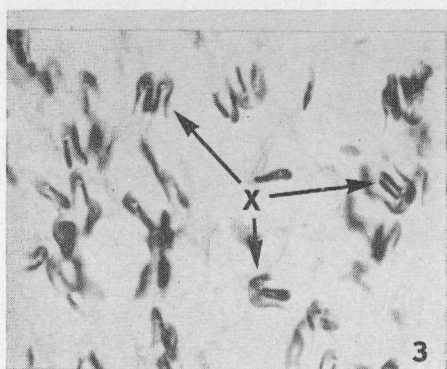


FIGURE 3. In an epididymis surrounded by a nonpigmented tunic, sperm maturation is indicated by the presence of paired sperm (X). Hematoxylin and eosin. 1000X.

normal spermatogenesis. Our findings of spermatogenesis and sperm maturation in testes and epididymides surrounded by nonpigmented tunics indicated that a unilateral lack of melanin apparently does not interfere with normal testicular or epididymal function. Normal sperm maturation can occur even in the absence of pigmentation. Unfortunately, it was not possible to functionally evaluate sperm from the nonpigmented side. However, a powerful argument for normality of the sperm is the presence of paired sperm in the epididymis. In addition, it should be noted that the animal raised in-house was one of the few successful cases of indoor breeding of *Didelphis* here at Wright State University.

Pigmentation of the tunica vaginalis in American marsupials varies with species, being darker in the South American *Caluromys derbiana* and *Philander opossum* and the Mexican *Marmosa mexicana* than in the North American *Didelphis marsupialis* (Biggers 1966). Gardner (1973) observed that the total body coloration of *Didelphis virginiana* shifts to a paler color with northern distribution. Therefore, the nonpigmented tunica vaginalis may be another characteristic associated with the animal's distribution to cooler climates. The observation of unilateral white tunics in two animals trapped near Chicago, Illinois by Finkel (1945), and our present observations support this concept. The possibility of individual variation being the basis of the unilateral absence of pigmentation, however, cannot be dismissed.

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